

**CLAIMS**

1. A spin-valve transistor comprising an emitter (E),  
a base (B) and a collector (C), the emitter (E)  
5 being made of a semiconductor material, the base  
comprising three successive metal layers, the  
first layer (F1) and the third layer (F2) being  
ferromagnetic, the second layer (N) not being  
ferromagnetic, the interface between the emitter  
10 (E) and the layers of the base (B) forming a  
Schottky diode, characterized in that the  
collector (C) is metallic and separated from the  
base (B) by a thin insulating layer (I) of  
approximately a few nanometers, said layer forming  
15 a tunnel-effect barrier between the base (B) and  
said collector (C).
2. The spin-valve transistor as claimed in claim 1,  
characterized in that the insulating layer (I)  
20 presents a lower-level potential barrier than the  
potential barrier of the Schottky diode existing  
between the emitter (E) and the base (B).
3. The spin-valve transistor as claimed in claim 2,  
25 characterized in that the insulating layer (I) is  
made of tantalum oxide or of zinc sulfide or of  
zirconium oxide or of a rare earth oxide such as  
yttrium oxide.
- 30 4. The spin-valve transistor as claimed in claim 1,  
characterized in that the insulating layer (I) has  
a thickness of approximately between 1 and  
4 nanometers.
- 35 5. The spin-valve transistor as claimed in claim 1,  
characterized in that the emitter (E) comprises at  
least one layer of semiconductor material and the  
collector (C) at least a first layer of metallic  
material.

6. The spin-valve transistor as claimed in claim 4,  
characterized in that the layer of semiconductor  
material of the emitter (E) comprises at least a  
5 second layer of metallic material (A).
7. The spin-valve transistor as claimed in claims 4  
and 5, characterized in that electrical connection  
means ( $C_E$ ,  $C_B$  and  $C_C$ ) are implanted on the level of  
10 the first layer of metallic material, on the level  
of the second layer of metallic material and of  
any one of the layers ( $F1$ ,  $N$ ,  $F2$ ) of the base,  
said connection means being used to apply external  
voltages and currents to the transistor.  
15
8. The spin-valve transistor as claimed in claim 1,  
characterized in that the electrical voltage  
applied between the emitter (E) and the base (B)  
via the connection means ( $C_E$ ) and ( $C_B$ ) is greater  
20 than the potential barrier of the insulating layer  
(I).